UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,377	10/21/2003	Michael Francis Higgins	08831.0058	8648

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EXAMINER
MA, TIZE

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/691,377	HIGGINS ET AL.
	Examiner	Art Unit	
	Tize Ma	4154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>21 October 2003</u>.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-26</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-26</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>10/21/2003</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Specification

1.   The disclosure is objected to because of the following informalities: In paragraph

[01] under Related Applications, three serial numbers of the referenced applications are

missing (see lines 6, 7, and 9 on page 1). Proper filling the actual application serial

numbers is required.

2.   The abstract of the disclosure is objected to because its content is inconsistent

with the description of the invention. In the specification, specifically the Detailed

Description, a method of converting three colors, RGB to four colors, RGBW, is

disclosed. The colors, C1, C2, C3 are not mentioned. However, in the Abstract, C1, C2,

C3 are used instead of R, G, B.   Correction is required.

3.   Label for element 302 in Fig. 3 is inconsistent with the element feature. The

element 302 has 3 inputs and 4 outputs. However, the label says "3xN MULTIPLY".

Correction is required. Relevant text in the specification (Paragraph [030] line 2) needs

to be changed accordingly.

Double Patenting

4.   The nonstatutory double patenting rejection is based on a judicially created
doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the
unjustified or improper timewise extension of the "right to exclude" granted by a patent
and to prevent possible harassment by multiple assignees.   A nonstatutory
obviousness-type double patenting rejection is appropriate where the conflicting claims
are not identical, but at least one examined application claim is not patentably distinct
from the reference claim(s) because the examined application claim is either anticipated
by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140
F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29
USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir.
1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5.   Claim 1-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, and 11-13 of copending Application No. 10/691396. Although the conflicting claims are not identical, they are not patentably distinct from each other. In the analysis below, it is interpreted that the terms "colors", "color point(s)", "primary color(s)", "primary color point(s)", and "primaries" in the claims in the instant application and referenced copending application have equivalent meanings.

6.   The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows in Table 1 below.

Instant Application	10/691396
1.A method for converting	1. A method for converting
a three-color image data set comprising C1, C2, and C3 colors	source color points in source image data from a source color space to a target color space, said source color space defined by a combination of N source primary color points, wherein N

	is an integer,
into a four-color image data set comprising C1, C2, C3 and W colors, the method comprising:	the method comprising: for the target color space, defining a set of at least N+l target primaries in which to render said source color points as a combination of said target primaries; said at least N+l target primaries forming the boundary of the target color space;
dividing said color space comprising a C1, C2, C3, and W color point into a set of regions bounded by W and two of a group, said group comprising: C1, C2 and C3; and	dividing said target color space into a set of regions that are bounded by at least two of the at least N+l target primaries and by said interior color point;
determining a mapping from image data points in any one of said regions, said image data points comprising C1, C2 and C3 color values, to image data points comprising C1, C2, C3, and W.	calculating a solution matrix for each said region; and for a given source color point in said source color space, selecting one of said solution matrices for rendering said source color point in said target color space; and computing an output color point using said source color point and said selected solution matrix.
	2. The method of Claim 1 wherein N is 3.
	3. The method of Claim 1 wherein said interior color point is the white point of the target color space.

Table 1

7.   The claim 1 in the copending application claims ~~a method for converting image~~ data from a color space comprising N colors to a color space comprising N+1 colors (A method for converting source color points in source image data from a source color space to a target color space, said source color space defined by a combination of N source primary color points, wherein N is an integer, the method comprising:

for the target color space, defining a set of at least N+1 target primaries in which to render said source color points as a combination of said target primaries; said at least N+I target primaries forming the boundary of the target color space). When N is chosen to be 3 and the N+1 th color is chosen to be W (white), the claim 1 in the copending ~~application can be re-stated~~ as

A method for converting a three-color image data set comprising three colors (C1, C2, and C3) into a four-color image data set comprising C1, C2, C3 and W colors, ~~the method comprising:~~

dividing said color space comprising a C1, C2, C3, and W color point into a set of regions bounded by W and two of a group, said group comprising: C1, C2 and C3; (dividing said target color space into a set of regions that are bounded by at least two of the at least N+I target primaries and by said interior color point;) and

determining a mapping from image data points in any one of said regions, said image data points comprising C1, C2 and C3 color values, to image data points comprising C1, C2, C3, and W (calculating a solution matrix for each said region for a given source color point in said source color space, selecting one of said solution matrices for

~~rendering said source color point in said target color space; and~~

computing an output color point using said ~~source color~~ point and said selected solution

~~matrix). It is interpreted that (1) W is the interior color point; (2)~~ "calculating ...",

"selecting ...", "rendering ... " and "computing ..." are the detail steps of "determining a

mapping". Therefore the claim 1 in the copending application completely covers the

scope of claim 1 in the instant application.

Using the same reasoning, the subject matter in claim 1 in the instant application is

also fully disclosed in the claims 2 and 3 in the copending application where N is 3 and

W (white) is the interior color point in the target color space.

8.   This is a <u>provisional</u> obviousness-type double patenting rejection because the

conflicting claims have not in fact been patented.

9.   Claim 15 is provisionally rejected on the ground of nonstatutory obviousness-type

double patenting as being unpatentable over claims 11-13 of copending Application No.

10/691396. Although the conflicting claims are not identical, they are not patentably

distinct from each other.

10.   The subject matter claimed in the instant application is fully disclosed in the

referenced copending application and would be covered by any patent granted on that

copending application since the referenced copending application and the instant

application are claiming common subject matter, as follows in Table 2 below.

Instant Application	10/691396
15. An image system comprising:	11. An image processing system
a display for displaying a three-color	for converting source color points in

image data set comprising C1, C2, and C3 colors	source image data from a source color space to a target color space, said source color space defined by a combination of N primary color points, wherein N is an integer, said image processing system comprising:
converted into a four-color image data set comprising C1, C2, C3 and W colors; and	a display panel configured to display image data in said target color space; said target color space being defined by a set of at least N+I target primary color points forming a boundary of said target color space; and
processing circuitry	processing circuitry configured to define an interior color point positioned in the interior of the boundary of said target color space,
to divide said color space comprising a C1, C2, C3, and W color point into a set of regions bounded by W and two of a group, said group comprising: C1, C2 and C3 and	to divide said target color space into a set of regions that are bounded by at least two of said N+I target primary color points and by said interior color point,
to determine a mapping from image data points in any one of said regions, said image data points comprising C1, C2 and C3 color values, to image data points comprising C1, C2, C3, and W.	to calculate a solution matrix for each said region, and to select one of said solution matrices for rendering a source color point on said display panel with defined by said target primary color points.
	12. The image processing system of Claim 11 wherein N is 3.
	13. The image processing system of Claim 11 wherein said interior color point is the white point of the target color space.

Table 2

11.   As shown in Table 2, the claim 11 of the copending application discloses the

same system with the same display and the same processing circuitry when N is 3 and

N+1 th color is W, as in the claim 15 in the instant application. ~~The detail explanation~~

~~would be the same as that regarding claim 1 and would not be repeated here.~~

The subject matter in claim 15 in the instant application is also fully disclosed in the

claims 12 and 13 in the copending application where N is 3 and W (white) is the interior

color point in the target color space.

12.   This is a <u>provisional</u> obviousness-type double patenting rejection because the

conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

13.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of
> making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the
> art to which it pertains, or with which it is most nearly connected, to make and use the same and shall
> set forth the best mode contemplated by the inventor of carrying out his invention.

14.   Claim 1 and 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to

comply with the enablement requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to enable one skilled in the art to

which it pertains, or with which it is most nearly connected, to make and/or use the

invention. The method and the system for converting image data set from a color space

comprising C1, C2, C3 to a color space C1, C2, C3, and W are not described in the

specification. Instead, the conversion from RGB to RGBW is described. The examiner's

recommendation is to re-group and combine the claims, and restrict the colors C1, C2,

C3 to R, G, B in the claims so that one of the ordinary skill in the art can understand the

claims with the help of the specification.

15.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

16.   Claim 1 recites the limitation "said color space" in line 3. There is insufficient

antecedent basis for this limitation in the claim.

17.   Claim 15 recites the limitation "said color space" in line 4. There is insufficient

antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

18.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

19.   Claims 1-9, 15-22 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Childs et al (GB 2282928 A), and in view of Murdock et al (US 6,897,876 B2).

20.   Regarding claim 1 and 15, Childs et al teaches a method and a system

(decoding circuit) for converting a three-color image data set (video signal) to four-color

image data set (see Fig. 4 and lines 17-20 on page 12) by dividing (dissecting) the color

space into regions (triangles) (see lines 9-10 on page 6), and determining the mapping

from the three-color image data points to four-color image data points (a set of
numerical solutions) (see lines 19-20 on page 13 and Appendix 1 on page 25). Childs et
al uses the white point in his computation (see D65 in Fig. 3, and last three lines on
page 5 and equation 1f on page 6).

21. However, Childs et al does not teach that W (white color) is used as a primary
color in the target (four-color after conversion) color space.

22. Murdock et al teaches a method for converting three color (R, G, B) image data
set (input signals) to four color (R', G', B', W) image data set (output signals) (see
column 3, lines 49-54, and column 4, lines 56-61), where W is the white color for the
benefit that employing a white OLED (Organic Light Emitting Diodes) along with the red,
green, blue OLEDs to improve power efficiency and/or luminance stability of displays
over time(column 1, lines 26-28).

23. Therefore, it would have been obvious to one of ordinary skill in the art at the
time the invention was made to converting a three-color image data set into a four-color
image data set, by dividing a color space into regions, and
determining a mapping from image data points comprising three colors to image data
points comprising four colors with one of the colors as W (white) for the benefit of
improving power efficiency and/or luminance stability of displays over time.

24. Regarding claims 2 and 16, Murdock et al teaches R, G, B as the three primary
colors (see Fig. 1 and column 4, lines 56-61).

25.   Regarding claims 7 and 21, Murdock et all teaches setting different white point (additional primary close to white, see column 6, line 2-6). The actual values would be determined to adjust between the difference between the white points of source and target.

26.   Regarding claims 8 and 22, Childs et al teaches calculating the mapping to four color space from intermediate coefficients with matrix (see lines 8-29 on page 11 for the description of the calculation. The equation 3j on page 11 is equivalent to the equation in the instant claims).

27.   Regarding claim 9, both references teach calculating source and destination colors for groups of known primaries and white points (see page 4, line 26-32 in Child et al for calculating source color; page 5, line 15-20 for calculating destination color) and numerically solving for the mapping (see the numerical solutions on page 25, Appendix 1 in Child et al).

28.   Claim 10-13 and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Childs et al and Murdock et al as applied to claims 1-9 and 15-22 above, and further in view of Lin et al (US 6,421,142 B1).

29.   Regarding claims 10 and 23, the combination of Childs et al and Murdock et al reminds as applied above.

30.   However, the above combination does not teach detecting four color image data points that are out-of-gamut and effecting the change although Murdock et al discloses that any known gamut-mapping techniques may be applied to do the correction (column 6, line 35-40).

31.   Lin et al teaches a method and system (apparatus) for detecting out-of-gamut

(see steps S243, S245, and S247 in Fig 14; and column 13, lines 51-57) and mapping

the out-of-gamut color points into the gamut range (see Fig 15; and column 14, lines 26-

63) for the benefit of improving out-of-gamut mapping in a color reproduction system

comprising an input device and an output device (see column 3, line 61-62, and column

4, line 11-12).

32.   Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to combine the out-of-gamut color mapping after color space

conversion as shown in Lin at el in the previous combination for the benefit of improving

out-of-gamut mapping.

33.   Regarding claims 11 and 24, testing each color component of the image data

point to see if the color component is out of range is common practice of detecting out-

of-gamut (see steps S243, S245, and S247 in Fig 14; and column 13, lines 51-57 in Lin

et al).

34.   Regarding claims 12 and 25, it is not clear what is meant by "the maximum value

allowed for the given component" defined in the claim, the examiner interprets the

maximum value as a point on the boundary of the color gamut. Lin et al teaches the

maximum value as the chroma magnitude of the largest coordinate (see line 50 in

column 14).

35.   Regarding claims 13 and 26, it is not clear what is meant by "the maximum

allowed value" and "the maximum coefficients" or how the "scaling" is performed. The

examiner interprets "the maximum allowed value" as a point on the boundary of the

color gamut, "the maximum coefficients" as the coefficients of the interpolations which
bring the out-of-gamut color points to the boundary of the color gamut, and "scaling" as
calculating the coefficients of the interpolations. Lin et al teaches this calculation (see
column 19, line 40).

36.   Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al
(US 6,421,142 B1). Although using the different terminology, the instant claim is
covered by Lin et al as part of his out-of-gamut color mapping strategy. Lin et al teaches
calculating a scaling factor for out-of-gamut image data point (which is equivalent to the
coefficients of the interpolations in Lin et al, e.g., column 19, lines 30-43) comprising an
input channel to receive image data points (the input device in Lin et al, e.g., element 10
in Fig. 1); maximum coefficient detector (in Lin et al, the process of projection and clip is
to find a corresponding color point on the boundary of the output gamut for the out-of-
gamut color point. Therefore, the unit 87 along with unit 82 (87 labeled PROJ/CLIP
CHROMA and 82 labeled CHECK GAMUTS in Fig. 15) perform the function of a
maximum coefficient detector and a scaling unit. The maximum refers to the chroma
magnitude of the largest coordinates (line 50 in column 14) in the color space in the
method of projection/clip (element 87 in Fig 15)); an inverse look-up table (LUT) to store
the scaling factors (LUT and interpolation coefficients (see column 20, line 19-22) and a
scaling unit (the unit 87 along with unit 82 in Fig. 15).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tize Ma whose telephone number is 571-270-3709. The examiner can normally be reached on Mon-Fri 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on 571-272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

tm

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11/6/07